

# Free running acquisition system for Transition Radiation Detectors - in beam tests - \*

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The present acquisition system was developed as a test benchmark of a free running concept for high counting rate TRDs [1] based on FASP ASIC [2] and analog converters of the type foreseen to be implemented in a later stage in a hybrid updated version of FASP analog processor. This version can operate 64 TRD readout channels with a sample rate of 2 Msps and 12 bits resolution MAX 11105 ADCs. The system is based on a Spartan 6, SP601 evaluation board and a custom designed board for MAX 11105 analog converters [3,4]. Two such systems were built, each of them processing data from 32 pads. In order to merge the correlated data between several sub-detectors, a synchronization signal is used. The main tasks assumed by the system are: data unpacking from the 2 x 32 MAX 11105 and synchronisation management, capture of the MBS\_sync signal from a MBS (Multi-Branch System) system [5], packing the data and Ethernet transmission through UDP protocol. The mixed acquisition system, a trigger driven (MBS) and the free running, generates acquisition files which are later paired by a dedicated software. Data for TRD were collected based on the free running system described above while Cerenkov and Lead Glass by information was taken by the MBS system. The correctness of the data synchronisation is proved by the electron and pion pulse height distributions at three different momenta presented in Figures 1, 2 and 3.

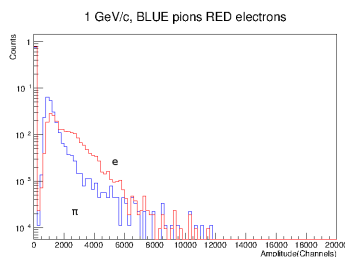


Figure 1: Pulse height distributions for electrons (red) and pions (blue) at 1 GeV/c momentum

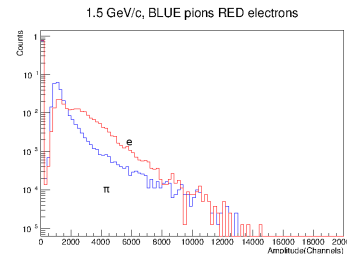


Figure 2: 1.5 GeV/c momentum

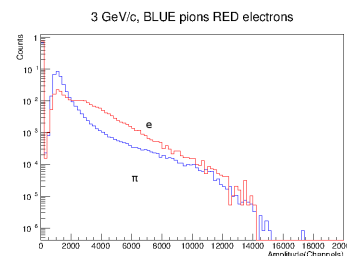


Figure 3: 3 GeV/c momentum

- [3] [http://www.xilinx.com/publications/prod\\_mktg/sp601\\_product\\_brief.pdf](http://www.xilinx.com/publications/prod_mktg/sp601_product_brief.pdf)
- [4] <http://www.maximintegrated.com/en/datasheet/index.mvp/id/6419>
- [5] [https://www.gsi.de/work/fairgsi/common\\_systems/csee\\_electronics/datenverarbeitung/datenerfassung/mbms.htm](https://www.gsi.de/work/fairgsi/common_systems/csee_electronics/datenverarbeitung/datenerfassung/mbms.htm)

## References

- [1] M. Petris et al Two dimension position sensitive real size CBM-TRD prototype. PHN-SIS18-ACC-38
- [2] V.Catanescu, CBM 10th Colaboration Meeting, Sept. 25-28,2007, Dresden

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